What is claimed is:

1. A method of predicting an electromagnetic scattering from a target, comprising:

covering at least a portion of an analytical model of the target with computational cells;

formulating a plurality of approximation functions including simplifying a set of method of moments equations based on Kirchhoff's first law to provide an impedance matrix multiplied by a solution vector equated with a right hand side vector;

setting a plurality of boundary conditions for the plurality of approximation functions; and

solving the plurality of approximation functions for the solution vector.

2. The method of Claim 1, wherein covering at least a portion of an analytical model of the target with computational cells includes covering at least a portion of the analytical model in accordance with the Nyquist criterion.

3. The method of Claim 1, wherein covering at least a portion of an analytical model of the target with computational cells includes covering at least a portion of the analytical model with computational cells having a linear dimension that is less than half of a wavelength of an incident electromagnetic energy.

4. The method of Claim 1, wherein covering at least a portion of an analytical model of the target with computational cells includes covering at least a portion of the analytical model with one or more first computational cells located near non-analytic boundaries and having a first linear dimension substantially smaller than half of a wavelength of an incident electromagnetic energy, and one or more second computational cells spaced apart from non-analytic boundaries and having a second linear dimension approximately equal to half of the wavelength of the incident electromagnetic energy.

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5. The method of Claim 1, wherein formulating a plurality of approximation functions includes simplifying a set of method of moments equations to provide an impedance matrix having a sparse lower submatrix and a non-square, relatively dense upper submatrix.

6. The method of Claim 1, wherein formulating a plurality of approximation functions includes formulating a number of approximation functions on the order of a number of computational cells.

7. The method of Claim 1, wherein formulating a plurality of approximation functions includes formulating a linear combination of analytic functions.

8. The method of Claim 7, wherein formulating a linear combination of analytic functions includes formulating a linear combination of at least one of polynomial functions and power series functions.

9. The method of Claim 1, wherein setting a plurality of boundary conditions includes forcing at least some derivatives of at least some of the approximation functions to be continuous.

10. The method of Claim 1, wherein setting a plurality of boundary conditions includes forcing a value of at least some of the approximation functions to be continuous.

11. The method of Claim 1, wherein solving the plurality of approximation functions for the solution vector includes:

modeling an electromagnetic source; and

populating the impedance matrix and the right hand side vector.

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12. The method of Claim 1, wherein solving the plurality of approximation functions for the solution vector includes reducing the impedance matrix to a single ~~equation~~ equations at sample points, generally one in each cell, by a transform.

13. The method of Claim 1, wherein solving the plurality of approximation functions for the solution vector includes reducing the impedance matrix to a diagonalized matrix by a transform.

14. The method of Claim 13, wherein the transform employs only arithmetic adds.

15. The method of Claim 1, wherein solving the plurality of approximation functions for the solution vector includes transforming a lower sparse submatrix of the impedance matrix into a lower triangular matrix.

16. The method of Claim 15, wherein the lower sparse submatrix is transformed into a lower triangular matrix by a QR decomposition.

17. The method of Claim 15, wherein the lower sparse submatrix is transformed into a lower triangular matrix by an ordered set of matrix operators.

18. The method of Claim 15, wherein the lower sparse submatrix is transformed into a lower triangular matrix by a Gaussian elimination operator.

19. The method of Claim 1, further comprising providing a plurality of sampling points distributed into at least some of the computational cells.

20. The method of Claim 19, wherein providing a plurality of sampling points distributed into at least some of the computational cells includes providing a plurality of sampling points based on at least one of an incident electromagnetic wave, a distribution of computational cells on the analytical model, and a resultant current distribution.

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21. The method of Claim 19, wherein providing a plurality of sampling points includes providing one sampling point in each free-field computational cell, and providing more than one sampling points in each non-analytic boundary computational cell.

22. A method of predicting an electromagnetic scattering from a target, comprising:

a first computer program portion adapted to cover at least a portion of an analytical model of the target with computational cells;

a second computer program portion adapted to formulate a plurality of approximation functions including simplifying a set of method of moments equations based on Kirchhoff's first law to provide an impedance matrix multiplied by a solution vector equated with a right hand side vector;

a third computer program portion adapted to set a plurality of boundary conditions for the plurality of approximation functions; and

a fourth computer program portion adapted to solve the plurality of approximation functions for the solution vector.

23. The computer program product of Claim 22, wherein the first computer program portion is further adapted to cover at least a portion of the analytical model in accordance with the Nyquist criterion.

24. The computer program product of Claim 22, wherein the first computer program portion is further adapted to cover at least a portion of the analytical model with computational cells having a linear dimension that is less than half of a wavelength of an incident electromagnetic energy.

25. The computer program product of Claim 22, wherein the second computer program portion is further adapted to simplify a set of method of moments equations to

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provide an impedance matrix having a sparse lower submatrix and a non-square, relatively dense upper submatrix.

26. The computer program product of Claim 22, wherein the second computer program portion is further adapted to formulate a linear combination of at least one of polynomial functions and power series functions.

27. The computer program product of Claim 22, wherein the third computer program portion is further adapted to force at least some derivatives of at least some of the approximation functions to be continuous.

28. The computer program product of Claim 22, wherein the third computer program portion is further adapted to force a value of at least some of the approximation functions to be continuous.

29. The computer program product of Claim 22, wherein the fourth computer program portion is further adapted to model an electromagnetic source, and populate the impedance matrix and the right hand side vector.

30. The computer program product of Claim 22, wherein the fourth computer program portion is further adapted to reduce the impedance matrix to a single equation by a transform.

31. The computer program product of Claim 22, wherein the fourth computer program portion is further adapted to reduce the impedance matrix to a diagonalized matrix by a transform.

32. The computer program product of Claim 22, further comprising a fifth computer program portion adapted to provide a plurality of sampling points distributed into at least some of the computational cells.

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33. The computer program product of Claim 22, further comprising a fifth computer program portion adapted to provide a plurality of sampling points based on at least one of an incident electromagnetic wave, a distribution of computational cells on the analytical model, and a resultant current distribution.

34. A computer system for predicting an electromagnetic scattering from a target, comprising:

a memory device;

a processor operatively coupled to the memory device and adapted to perform electromagnetic scattering computations, the processor including:

a first component adapted to cover at least a portion of an analytical model of the target with computational cells;

a second component adapted to formulate a plurality of approximation functions including simplifying a set of method of moments equations based on Kirchhoff's first law to provide an impedance matrix multiplied by a solution vector equated with a right hand side vector;

a third component adapted to set a plurality of boundary conditions for the plurality of approximation functions; and

a fourth component adapted to solve the plurality of approximation functions for the solution vector.

35. The computer system of Claim 33, wherein the first component is further adapted to cover at least a portion of the analytical model with computational cells having a linear dimension that is less than half of a wavelength of an incident electromagnetic energy.

36. The computer system of Claim 33, wherein the second component is further adapted to simplify a set of method of moments equations to provide an impedance matrix having a sparse lower submatrix and a non-square, relatively dense upper submatrix.

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37. The computer system of Claim 33, wherein the third component is further adapted to force at least some derivatives of at least some of the approximation functions to be continuous.

38. The computer system of Claim 33, wherein the third component is further adapted to force a value of at least some of the approximation functions to be continuous.

39. The computer system of Claim 33, wherein the fourth component is further adapted to reduce the impedance matrix to a single equation by a transform.

40. The computer system of Claim 33, wherein the fourth component is further adapted to reduce the impedance matrix to a diagonalized matrix by a transform.

41. The computer system of Claim 33, further comprising a fifth component adapted to provide a plurality of sampling points distributed into at least some of the computational cells.

42. The computer system of Claim 33, further comprising a fifth component adapted to provide a plurality of sampling points based on at least one of an incident electromagnetic wave, a distribution of computational cells on the analytical model, and a resultant current distribution.

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